magnesium (Mg), lithium (Li), cesium (Cs), barium (Ba), potassium (K), beryllium (Be), and calcium (Ca).

D4 Cancelled

40. (New) A method according ~~to claim 5, wherein the atmosphere is a dry argon~~ atmosphere.--

REMARKS

The Notice of Non-Compliant Amendment dated **August 29, 2001**, has been received and its contents carefully noted. Please note that a clean version of claim 5 is being submitted in accordance with 37 C.F.R. 1.121 (c)(1)(i). Applicant respectfully submits that this response is timely filed and is substantially the same as that filed on August 20, 2001..

Claims 1-35 were pending in the present application prior to the aforementioned amendment, with claims 6 and 24-29 being withdrawn from consideration as drawn to a non-elected species. Due to the above Amendment, claims 1-5, 7, 10, 21, 30-35 have been amended and new claims 36-40 have been added to recite additional subject matter to which Applicant is entitled. Applicant submits that no issue of new matter is raised by this Amendment. Accordingly, claims 1-40 are now pending in the present application and, at least for the reasons set forth below, are believed to be in condition for allowance.

Initially, the Office Action objects to the specification as containing various informalities. Due to the above Amendment, Applicant has amended the informalities on pages 1, 2, 14, 19 and 31.

The Office Action rejects claims 4, 5, 30, 31 and 32 under 35 U.S.C. 112, second paragraph as indefinite. By the above Amendment, claims 1-5, 7, 10, 21, 30-35 have been amended to obviate the above-noted rejection. In particular, the recitation "an

uppermost layer", has been deleted from each claim. Accordingly, reconsideration and withdrawal of the rejection are respectfully solicited.

The Office Action rejects claims 1, 2, 8, 13, 15, and 19 under 35 U.S.C. §103(a) as unpatentable over ***Tang et al.*** (U.S. Patent No. 5,684,365) in view of ***Kurosawa et al.*** (U.S. Patent No. 6,057,647) and ***Shimoda et al.*** (JP 10-12377), claims 3, 4, 5, and 30-32 under 35 U.S.C. 103(a) as unpatentable over ***Tang et al.*** in view of ***Kurosawa et al.***, ***Shimoda et al.*** and ***Ogura et al.***, claim 7 under 35 U.S.C. 103(a) as unpatentable over ***Tang et al.*** in view of ***Kurosawa et al.***, ***Shimoda et al.***, ***Ogura et al.*** and ***Littman et al.*** (U.S. Patent No. 5,688,551), claims 9, 14, 16, 18 and 20 under 35 U.S.C. 103(a) as unpatentable over ***Tang et al.*** in view of ***Kurosawa et al.***, ***Shimoda et al.***, ***Ogura et al.*** and ***SID 99 Digest***, pp. 376-379, claims 10, 21, and 33 under 35 U.S.C. 103(a) as unpatentable over ***Tang et al.*** in view of ***Kurosawa et al.***, ***Shimoda et al.***, ***Ogura et al.*** and ***Kim et al.*** (U.S. Patent No. 6,100,954), and claims 11, 12, 22, 23, 34 and 35 under 35 U.S.C. 103(a) as unpatentable over ***Tang et al.*** in view of ***Kurosawa et al.***, ***Shimoda et al.***, ***Ogura et al.*** and ***Nagao*** (JP 62-090260). By the above Amendment, claims 1-5, 7, 10, 21, 30-35 have been amended to recite subject matter which is patentably distinct over the prior art of record. Reconsideration and withdrawal of the rejection is respectfully solicited.

The claimed invention is directed to a method of manufacturing an electrical device, comprising the steps of forming a thin film transistor, <u>forming an insulating film over the thin film transistor</u>, and forming an EL layer through an ink jet method.

As the Examiner well knows, in formulating a rejection under 35 USC §103, a four-level factual inquiry must be conducted. First, determining the scope and content of the prior art. Secondly, ascertaining the differences between the claimed invention and the prior art. Thirdly, resolving the level of ordinary skill in the pertinent art. And last, an evaluation of objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17

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(1966). In essence, to establish a *prima facie* case of obviousness, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974).

Applicant respectfully contends that the claims as presently recited set forth subject matter which is clearly patentably distinct over the prior art of record. More particularly, Applicant respectfully contends that the ***Tang et al.*** patent, either alone or in combination with at least one of in view of ***Kurosawa et al.***, ***Shimoda et al.***, ***Ogura et al.***, ***Littman et al.***, ***SID 99 Digest***, ***Kim et al.*** and ***Nagao***, fails to expressly teach or inherently suggest all of the limitations presently set forth in the claimed invention necessary to support a *prima facie* case of obviousness under §103. Nor is there any motivation in the prior art of record to modify the ***Tang et al.*** patent to thereby accomplish what is set forth in the claimed invention.

Referring now to the rejection, while the Office Action finds that the proposed ***Tang et al.-Ogura et al.*** modification teaches an insulating film against alkali metal, it discloses that the first ion barrier layer 2a comprises Si_3N_4 preventing diffusion of alkali metal ion from the glass substrate 1, while the second ion barrier layer 2b comprises SiO_2 for improving the adhesiveness with the transparent electrode 3 (abstract). Thus, while the penetration of alkali ions from the glass substrate is capable of being prevented, there is no thin film transistor included in the proposed ***Tang et al.-Ogura et al.*** modification. Accordingly, the claimed invention is not realized by the proposed ***Tang et al.-Ogura et al.*** modification, since the problem that occurs when an alkali metal is diffused into the thin film transistor so that the thin film transistor is fatally damaged is not recognized.

The proposed ***Tang et al.-Nagao*** modification discloses an antiwear protective film for a thermal head composed of a Si-Al-O-N-M type substance. However, the protective film is used in the thermal head, and thus, there is no express or implied disclosure to use the protective film in the ***Nagao*** patent for the same purpose of <u>using</u>

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the insulating film in the EL device of the claimed invention, which is to prevent alkali metals from entering the thin film transistor.

And while the proposed ***Tang et al.-Kurosawa et al.*** and ***Tang et al.-Shimoda et al.*** each appear to disclose the use of an ink jet method, each combination fails to expressly teach or implicitly suggest the use of an insulating film capable of preventing penetration of an alkali metal.

Moreover, there is also a lack of suggestion in the prior art as to why one of ordinary skill in the art would use the proposed ***Tang et al.*** modifications to achieve the unobvious advantages first recognized by the Applicant. In particular, it is respectfully submitted that practice of the claimed method yields advantageous benefits that are not disclosed in the prior art of record, namely, any of the proposed ***Tang et al.*** modifications. For instance, the step of forming an insulating film over the thin film transistor provides unobviously advantageous structural benefits which are not present in the prior art.

When an EL layer is formed through the ink jet method, due to the fact that an ink jet method is performed under normal pressure, it is disadvantageous in the point that contaminants in the external atmosphere are easily taken in during the process. Namely, the ink jet method is unfavorable because EL layers are formed in a state of easily including mobile ions such as alkaline metals, diffusion of the alkaline metals, and therefore, can give fatal damage to the TFTs. Note that throughout the Specification alkaline metals and alkali-earth metals are together referred to as "alkaline metals" (*See*, page 2, line 22 through page 3, line 1). Further, if a cathode formed adjacent to the EL layer comprises an alkali metal such as lithium (*See*, page 26, lines 19-28), the alkali metal in the cathode presents a problem in addition to that in the EL layer.

Accordingly, by providing an insulating film between the thin film transistor and the EL layer provides an unobvious advantageous feature since it prevents the penetration

of alkali metals from the EL layer to the thin film transistor. Thus, the thin film transistor can be protected from alkali metal by the insulating film, so that the EL device using the thin film transistor as a switching element can be manufactured with good operation performance and high reliability.

On the other hand, since neither of the proposed ***Tang et al.*** modifications expressly teaches or inherently providing an insulating film between the thin film transistor and the EL layer, practice of their combined teachings would not yield the benefits presently set forth in the claimed invention.

Accordingly, since neither of the proposed ***Tang et al.*** modifications expressly teaches or implicitly suggests the disclosed features of the present invention, and also fail to recognize the unobvious advantages first proposed by Applicant, Applicant respectfully requests favorable reconsideration and withdrawal of the §103 rejections. Should the Examiner deem that a conference would expedite prosecution of the instant application, the Examiner is hereby invited to telephone the undersigned to arrange such a conference.

Respectfully submitted,

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Marked-up copy of amended Specification.

On page 1, please replace the first full paragraph with the following.

Techniques of forming a TFT on a substrate have been widely progressing in recent years, and developments of applications to an active matrix type display device are advancing. In particular, a TFT using a polysilicon film has a higher electric field effect mobility (also referred to as mobility) than a TFT using a conventional [amorous] amorphous silicon film, and high speed operation is therefore possible. As a result, it becomes possible to perform pixel control, conventionally performed by a driver circuit external to the substrate, by a driver circuit formed on the same substrate as the pixel.

On page 2, please replace the third full paragraph with the following.

As a technology for solving such a problem, a technique of forming EL layers by an ink jet method is suggested. For example, an active matrix EL display in which EL layers are formed using an ink jet method is disclosed in Japanese Patent Application Laid-Open No. Hei 10-012377. Further, a similar technique is also disclosed in [Shimada] Shimoda, T. et al., SID 99 DIGEST, P376-9, "Multicolor Pixel Patterning of Light-Emitted Polymers by Ink-Jet Printing."

On page 14, please replace the second full paragraph with the following.

Further, by making the passivation film 41 possess a heat radiation effect, it is also effective in preventing thermal degradation of the EL layer. Note that light is emitted from the base 11 side in the Fig. 1 structure of the EL display device, and therefore it is necessary for the passivation film 41 to have light transmitting characteristics. In addition, in a case of using an organic material for the EL layer, it deteriorates by bonding with oxygen, so it [if] is preferable not to use an insulating film that easily releases oxygen.

On page 19, please replace the third full paragraph with the following.

After banks 101a and 101b are formed, an EL layer 47 is next formed (an organic material is preferable). The EL layer may be used by a single layer <u>or</u> by a laminate structure, but there are more cases in which <u>a</u> laminate structure is used. Though various laminate structures are suggested by combining an emitting layer, an electron transporting layer, an electron injecting layer, a hole injecting layer [or], a hole transporting layer, any structure is acceptable in the present invention. Further, a fluorescent dye, etc. may be doped in the EL layer.

On pages 31-32, please replace the third full paragraph with the following:

Next, as shown in Fig. 3C, the protecting film 303 is removed, and activation of the added periodic table group <u>V</u> [15] element is performed. A known technique of activation may be used as the means of activation, and activation is done in embodiment 1 by irradiation of excimer laser light. Both of pulse emission type laser and a continuous emission type laser may be used, and it is not necessary to place any limits on the use of excimer laser light. The goal is the activation of the added impurity element, and it is preferable that irradiation is performed at an energy level at which the crystallization silicon film does not melt. Note that the laser irradiation may also be performed with the protecting film 303 in place.

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Marked-up copy of amended claims.

1. (Amended) A method for manufacturing an [electro-optical] electrical device, said method comprising the steps of:

forming [a plurality of TFTs over a substrate] at least a thin film transistor on an insulating surface;

forming an insulating film over the thin film transistor;

forming [a plurality of pixel electrodes each] a pixel electrode over the insulating film, said pixel electrode being connected to [each of the plurality of TFTs] the thin film transistor; [and]

forming an EL layer over [the plurality of pixel electrodes,] the pixel electrode;

forming a second electrode over the EL layer,

wherein the EL layer is selectively formed through an ink jet method,

wherein the insulating film comprises silicon,

wherein the insulating film is capable of preventing penetration of alkaline metal.

2. (Amended) A method for manufacturing an [electro-optical] electrical device, said method comprising the steps of:

forming [a plurality of TFTs over a substrate] at least a thin film transistor;

forming an insulating film over the thin film transistor;

forming [a plurality of pixel electrodes each] a pixel electrode over the insulating film, said pixel electrode being connected to [each of the plurality of TFTs] the thin film transistor; [and]

forming an EL layer over [the plurality of pixel electrodes,] the pixel electrode;

forming a second electrode over the EL layer,

wherein the EL layer is selectively formed through an ink jet method [corresponding to each of the plurality of pixel electrodes]

wherein the insulating film comprises aluminum oxide,

wherein the insulating film is capable of preventing penetration of alkaline metal.

3. (Amended) A method for manufacturing an [electro-optical] electrical device, said method comprising the steps of:

forming [a plurality of TFTs over a substrate] at least a thin film transistor on an insulating surface;

forming an insulating film over the thin film transistor;

forming [a plurality of pixel electrodes each] a pixel electrode over the insulating film, said pixel electrode being connected to [each of the plurality of TFTs] the thin film transistor;

forming [a first] an EL layer [that emits red-colored light] over [a] the pixel electrode [disposed on a pixel that corresponds to red among the plurality of pixel electrodes];

[forming a second EL layer that emits green-colored light over a pixel electrode disposed on a pixel that corresponds to green among the plurality of pixel electrodes; and]

[forming a third EL layer that emits blue-colored light over a pixel electrode disposed on a pixel that corresponds to blue among the plurality of pixel electrodes,]

forming a second electrode over the EL layer;

wherein [each of the first, second and third EL layers] the EL layer is selectively formed through an ink jet method,

wherein the insulating film comprises diamond like carbon,

wherein the insulating film is capable of preventing penetration of alkaline metal.

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4. (Amended) A method for manufacturing an [electro-optical] electrical device, said method comprising the steps of:

forming [a plurality of TFTs over a substrate] at least a thin film transistor on an insulating surface;

forming an insulating film [covering the plurality of TFTs] over the thin film transistor;

[forming a plurality of openings in the insulating film;]

forming [a plurality of pixel electrodes each] a pixel electrode over the insulating film, said pixel electrode being connected to [each of the plurality of TFTs] the thin film transistor; [and]

forming an EL layer [selectively through an ink jet method] over the [plurality of pixel electrodes,] pixel electrode;

forming a second electrode over the EL layer,

wherein the El layer is selectively formed through an ink jet method in an atmosphere comprising nitrogen,

wherein [an uppermost layer of] the insulating film is capable of preventing penetration of [an] alkaline metal.

5. (Amended) A method for manufacturing an [electro-optical] electrical device comprising the steps of:

forming [a plurality of TFTs over a substrate] at least a thin film transistor on an insulating surface;

forming an insulating film [covering the plurality of TFTs] over the thin film transistor;

[forming a plurality of openings in the insulating film;]

forming [a plurality of pixel electrodes each] a pixel electrode over the insulating film, said pixel electrode being connected to [each of the plurality of TFTs] the thin film transistor; [and]

forming an EL layer over [the plurality of pixel electrodes] the pixel electrode; [through an ink jet method selectively corresponding to each of the plurality of pixel electrodes,]

forming a second electrode over the EL layer,

wherein the EL layer is selectively formed through an ink jet method in an atmosphere comprising argon,

wherein [an uppermost layer of] the insulating film is capable of preventing penetration of [an] alkaline metal.

7. (Amended) A method according to claim [3] 1,

[wherein the pixel that corresponds to red, the pixel that corresponds to green and the pixel that corresponds to blue are formed in contact with each other]

wherein an organic resin film is formed the thin film transistor and the insulating film.

10. (Amended) A method according to claim 4,

[wherein the insulating film comprises:

an organic resin film;

an insulating layer being capable of preventing penetration of an alkaline metal on the organic resin film]

wherein an organic resin film is formed between the thin film transistor and the insulating film.

21. (Amended) A method according to claim 5,

[wherein the insulating film comprises:

an organic resin film;

an insulating layer being capable of preventing penetration of an alkaline metal on the organic resin film]

<u>wherein an organic resin is formed between the thin film transistor and the insulating film</u>.

30. (Amended) A method according to claim 1, [further comprising the step of:]

[forming an insulating film covering the plurality of TFTs,

wherein an uppermost layer of the insulating film is capable of preventing penetration of an alkaline metal]

<u>wherein one of the pixel electrode and the second electrode comprises at least one selected from the group consisting of magnesium (Mg), lithium (Li), cesium (Cs), barium (Ba), potassium (K), beryllium (Be), and calcium (Ca)</u>.

31. (Amended) A method according to claim [2] <u>1</u>, [further comprising the step of:]

[forming an insulating film covering the plurality of TFTs,

wherein an uppermost layer of the insulating film is capable of preventing penetration of an alkaline metal]

<u>wherein the insulating film comprises at least one selected from the group consisting of silicon nitride oxide and silicon nitride</u>.

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32. (Amended) A method according to claim [3] 2, [further comprising the step of:]

[forming an insulating film covering the plurality of TFTs,

wherein an uppermost layer of the insulating film is capable of preventing penetration of an alkaline metal]

wherein an organic resin is formed between the thin film transistor and the insulating film.

33. (Amended) A method according to claim [32] 2,

[wherein the insulating film comprises:

an organic resin film;

an insulating layer being capable of preventing penetration of an alkaline metal on the organic resin film]

wherein one of the pixel electrode and the second electrode comprises at least one selected from the group consisting of magnesium (Mg), lithium (Li), cesium (Cs), barium (Ba), potassium (K), beryllium (Be), and calcium (Ca).

34. (Amended) A method according to claim [32] 2,

wherein the insulating film [comprising at least one of the elements selected from a group consisting of B (boron), C (carbon) and N (nitrogen) and at least one of the elements selected from a group consisting of Al (aluminum), Si (silicon) and P (phosphorus)] comprises aluminum nitride.

35. (Amended) A method according to claim [32] 3,

[wherein the insulating film comprises Si, Al, N, O and M,

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wherein M is at least an element selected from a rare-earth element, preferably an element selected from the group consisting of Ce (cesium), Yb (ytterbium), Sm (samarium), Er (erbium), Y (yttrium), La (lanthanum), Gd (gadolinium), Dy (dysprosium), and Nd (neodymium)]

wherein an organic resin is formed between the thin film transistor and the insulating film.

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